
Space Weather Forecast

Issued on Monday, 02 January 2023 at 01:00 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Chance of Moderate-flares throughout. Chance of Minor Geomagnetic Storm intervals from late on day 2 (3rd).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with only a few minor common class flares. There are currently six numbered active regions on the visible disc. The largest and most complex region is just west of centre disc, but showed some signs of decay during the period. The next complex region is in the southwest and is moderately large, with some close spots. There are two other moderately large regions on the disc; one in the northwest and one in the northeast, but both these groups are more open. The final region is a small simple spot in the northwest which decayed through the period.

There were no obvious signs of Earth-Directed Coronal Mass Ejections (CMEs) in the available imagery during the period.

Solar Wind / Geomagnetic Activity: Solar winds were initially elevated to strong (550-620 km/s) but gradually declined to slightly elevated levels, near 460km/s late in the period. The total Interplanetary Magnetic Field was Weak throughout, with only weak fluctuations in the important north-south component. These wind parameters are indicative of a positive coronal hole high speed stream connection and resulted in predominantly Quiet to Unsettled geomagnetic activity (Kp1-3), with an Active (Kp4) interval observed between 01/2100-2400 UTC).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with an ongoing daily chance of Moderate X-ray flares. There is a slight chance of Strong class flares occurring.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on the 30th of December may cause a glancing impact at Earth either late on the 3rd Jan (Day 2) or early on the 4th Jan (Day 3). No other Earth directed CMEs are currently expected. The ongoing coronal hole influence is expected to gradually decline through days 1 and 2 (2nd and 3rd Jan). A further coronal hole enhancement is expected from day 3 (4th Jan).

Quiet to Unsettled geomagnetic activity, with a chance of Active initially, is expected to become increasingly Quiet on day 1 (2nd). There is a chance of activity increasing to Unsettled to Active levels later on day 2 (3rd) due to a glancing blow from the CME mentioned above, but more likely from day 3 (4th) upon the arrival of coronal hole influences, with a chance of a G1 minor/storm interval.

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Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no solar radiation storms occurring. However, there is a slight chance of these rising in response to any larger flares that may occur, and perhaps exceeding the S1/Minor Radiation storm level.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	5	20	30	40
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)

